

WHAT IS CLAIMED IS:

1. A method of fabricating a damascene structure, comprising:

providing a substrate;

forming a dielectric layer on the substrate;

5 defining the dielectric layer to form an opening, wherein a portion of the substrate is exposed by the opening;

forming a barrier layer conformal to a profile of the opening;

forming a metal layer over the substrate, wherein the metal layer fills the opening and covers the dielectric layer;

10 performing a first chemical mechanical polishing process with a first slurry to remove the metal layer until the barrier layer is exposed; and

performing a second chemical mechanical polishing process with a second slurry and a solution to remove the barrier layer, wherein the solution can adjust the zeta potential of the metal layer.

15 2. The method of claim 1, wherein the solution that adjust the zeta potential of the metal layer comprises an oxidant.

3. The method of claim 2, wherein the oxidant is selected from a group consisting of  $KIO_3$ ,  $H_2O_2$ ,  $Fe(NO_3)_3$  and  $(NH_4)_2S_2O_8$ .

20 4. The method of claim 2, wherein a concentration of the oxidant in the slurry is 0.1% to 5%.

5. The method of claim 2, wherein the oxidant is either dissolved into the solution and then mixed up with the second slurry on a polishing pad from different pipelines or added directly to the second slurry.

6. The method of claim 1, wherein the dielectric layer is made of a low-K

material and is selected from a fluorinated organic polymers group consisting of fluorinated hydrocarbon, fluorinated poly arylene ether aromatic polymer and hydrogen silsesquioxane.

7. The method of claim 1, wherein a material of the metal layer is selected from  
5 a group consisting of copper, tungsten and aluminum.

8. The method of claim 1, wherein the pH of the second slurry can be neutral.

9. The method of claim 1, wherein the pH of the second slurry can be alkaline.

10. The method of claim 1, wherein the opening can be a dual damascene opening, a trench for a metal conductive line, a via opening for a plug, a contact  
10 opening or an opening for a damascene structure.

11. A method of fabricating a damascene structure, comprising:

providing a substrate, wherein the substrate comprises a dielectric layer with an opening, a barrier layer conformal to a profile of the opening and a metal layer filling up  
the opening;

15 performing a first chemical mechanical polishing process with a first slurry to remove the metal layer until the dielectric layer is exposed; and

performing a second chemical mechanical polishing process with a second slurry that comprises an oxidant to remove a portion of the barrier layer, to form a damascene structure.

20 12. The method of claim 11, wherein the oxidant is either dissolved into a solution and then mixed up with the second slurry on a polishing pad from different pipelines or adding directly to the second slurry.

13. The method of claim 11 wherein the oxidant is selected from a group consisting of  $KIO_3$ ,  $H_2O_2$ ,  $Fe(NO_3)_3$  and  $(NH_4)_2S_2O_8$ .

14. The method of claim 11 wherein a concentration of the oxidant in the slurry is 0.1% to 5%.

15. The method of claim 11 wherein the pH of the second slurry can be neutral.

16. The method of claim 11, wherein the pH of the second slurry can be alkaline.

5 17. The method of claim 11, wherein a material of the metal layer is selected from a group consisting of copper, tungsten and aluminum.

18. A slurry for polishing a barrier layer comprises an oxidant, abrasive particles, surfactant, buffer solution, and anti-corrosive.

10 19. The slurry of claim 18, wherein the oxidant is selected from a group consisting of  $KIO_3$ ,  $H_2O_2$ ,  $Fe(NO_3)_3$  and  $(NH_4)_2S_2O_8$ .

20. The slurry of claim 18, wherein a concentration of the oxidant in the slurry is 0.1% to 5%.